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A KEY TO THE CULEX (DIPTERA, CULICIDAE) OF THE SOUTHEASTERN UNITED STATES, BY MALE TERMINALIA.

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At the present time twelve species of Culex have been recorded from nine of the southeastern states, as shown in Table 1. These have been placed in three subgenera:

Culex:—bahamensis. nigripalpus, pipiens, quinquefasciatus, restuans, salinarius, tarsalis.

Neoculex:—apicalis.

Melanoconion:—atratus, erraticus, pilosus, peccator.

The males of the subgenus **Melanoconion** are so similar that they can be positively identified only by an examination of their genitalia. This is also true of the subgenus **Culex**, although in this group the external differences between some of the species are more distinct, and after some experience one may identify them by markings alone. However an examination of the genitalia is often necessary to identify positively the species of the genus **Culex**. This is particularly true of specimens which have been damaged in light trap collections.

The technique used in studying the genitalia is a simple one taken from King (unpublished). The last two or three segments of the abdomen are clipped off with a fine pointed scissors and transferred to 10% KOH. This is heated for three to five minutes, care

[1]Grateful acknowledgement is made to Major S. J. Carpenter, Sn. C. and to Capt. W. W. Middlekauff, Sn. C., of the Entomology Department of the Fourth Service Command Medical Laboratory, for their many helpful suggestions.

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Appreciation is further expressed to Brig. Gen. James S. Simmons, M. C. and Col. W. A. Hardenbergh, Sn. C., Preventive Medicine Section, Office of the Surgeon General, U. S. Army, Washington, D. C.

Table 1. Distribution of the species of Culex in the Southeastern United States.

Species	Recorded from[3]								
	Fla.	Ga.	Ala.	Miss.	La.	Ark.	Tenn.	N. C.	S C.
apicalis	x	x	x	x	x	x	x	x	x
atratus	x								
bahamensis	x								
erraticus	x	x	x	x	x	x	x	x	x
nigripalpus	x	x	x		x				x
peccator	x	x	x	x	x	x	x	x	x
pilosus	x	x	x	x	x			x	x
pipiens		x	x				x	x	x
quinquefasciatus	x	x	x	x	x	x	x	x	x
restuans	x	x	x	x	x	x	x	x	x
salinarius	x	x	x	x	x	x	x	x	x
tarsalis					x	x	x		

being taken to prevent boiling. With the aid of a pipette the specimen is then transferred to distilled water and rinsed. Heating the water will help remove the remainder of the tissue. The chitinous structures remain undissolved. The specimen is then placed in a drop of glycerine on a slide, and dissected with a pair of minuten nadeln at the end of applicator or match sticks. It is best to use the high power of a binocular dissecting microscope for this procedure.

If a permanent mount is desired, the dissection may be made in a drop of chloral gum[4] and covered with a cover slip. In most cases it is well to separate the various structures so that they can be examined from all sides. In the present paper almost all of the figures were drawn from dissected structures which had been separated and mounted individually. Once mounted, the specimen should be examined under the low and high powers of a compound microscope to see all the details.

[3]From King, Roth, Toffaleti and Middlekauff, 1943.

[4]The formula for chloral gum is:

Gum arabic (clear lumps or powered)	8 gms.
Distilled water	8 c. c.
Glycerin	5 c. c.
Chloral hydrate	70 gms.
Glacial acetic acid	3 c. c.

(From King, Bradley and McNeel, 1942.)

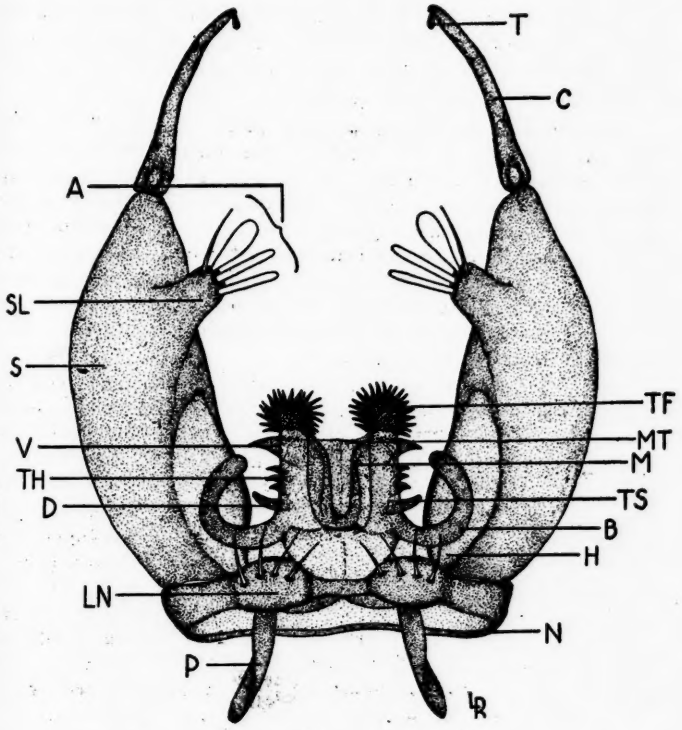

Fig. A.

A diagrammatic drawing of a genitalia, more or less typical, of the subgenus **Culex** (Dorsal view).

A=appendages of the subapical lobe of the sidepiece; B= basal arm of the tenth sternite; C=clasper; D=dorsal arm of the mesosome; H=hollow of the sidepiece; LN=lobe of the ninth tergite; M=mesosome; MT=membranous portion of the tenth segment; N=ninth segment; P=plate of paramere; S=sidepiece; SL=subapical lobe of the sidepiece; T=terminal spine of the clasper; TF=tuft of the tenth sternite; TH=tooth on the mesosome; TS=tenth sternite; V=ventral arm of the mesosome.

(The setae and pilosity of the sidepiece have not been drawn; only one pair of paramere plates is shown.)

Figures of the genitalia of most of the species of Culex can be found in the literature (Dyar, 1928; Matheson, 1929; Rozeboom, 1942, etc.). However these are often drawn or photographed on too small a scale to show the important structures.

The following description of the genitalia (Fig. A) is more or less typical for the subgenus Culex. The other subgeneric differences are discussed in the key. Only structures which are actually used in the key will be described and most of these characters for the different species have been illustrated. Fig. A is drawn from the dorsal position. Shortly after emergence the male terminalia rotates 180 degrees so that the tergites are actually on the underside. If the specimen is mounted with the claspers up, the tergites are turned upwards and are in their proper morphological position. This is referred to as the dorsal side.

Those segments posterior to the seventh abdominal segment are considered as comprising the male terminalia complex. The genitalia (hypopygium) begins with ninth segment (N) which is a complete chitinous ring. The ninth ergites are more or less developed depending on tinous ring. The ninth tergites are more or less developed depending on developed lobes (LN) which are so distinctive that they can be used to differentiate species. A large pair of appendages, the sidepieces (S) are attached to the sides of the ninth segment. These sidepieces are hollowed (H) basally on the inner surface to house the other structures. A more or less prominent subapical lobe (SL) arises near the upper part of the sidepiece and bears several appendages (A) of various sizes and shapes. Herms (1939) states that this lobe is a projection of the interbasal fold that has migrated up the dorsal side toward the apex of the sidepiece. A long clasper (C) which usually ends in a small terminal spine (T) is articulated from the apical end of the sidepiece. Lying between the sidepieces and within the ring formed by the ninth segment are several important structures, one of which is the tenth segment. This arises from the ninth segment and is a membranous structure (MT) with two supporting pigmented arms, the tenth sternites (TS), each bearing a tuft (TF) or a row of spines. These spines are usually darkly pigmented and therefore very conspicuous. A fairly stout, curved or straight basal arm (B) may arise near the base of the tenth sternite, and in some species curves down and extends ventrally around the mesosome. The mesosome (M) or peneal sheath, the other of the important structures between the sidepieces, lies behind the tenth sternite, is very complex and quite distinctive in each species of the subgenus Culex. Each mesosomal plate often possesses a dorsal (D) and ven-

tral (V) arm and some forms have teeth-like (TH) structures arising from between these arms. Parameres (P) are present but have not been used in the key.

KEY TO THE SPECIES OF CULEX BY MALE TERMINALIA

1. Tenth sternite with an apical tuft of short bristles or spines (Figs. 4, 11, 14, 17, 21) ---------- Subgenus **Culex** 2

   Tenth sternite comb-shaped apically, with a row of fairly stout teeth (Figs. 26, 27, 30) ---------- 8

2. Subapical lobe a prominent elevation arising at about the apical third of the sidepiece and bearing five to eight appendages; clasper with a small, rounded terminal spine; patches of setae lacking from both the sidepiece and the subapical lobe (Figs. 1, 9, 12, 15, 19) ---- 3

   Subapical lobe fairly long and stout, thumb-shaped, arising from about the middle of the sidepiece and bearing three short stout apical rods, two of these with bent tips; a patch of broadened setae on the lobe below the rods, another patch of long slender setae at the base of the lobe and a third medianly outward on the sidepiece; clasper without a terminal spine (Fig. 23) ---------- **Culex bahamensis**

3. Subapical lobe of sidepiece with eight appendages (Fig. 1); base of tenth sternite produced laterally into a blunt point or a short, nearly straight arm (Figs. 4, 5, 6); ventral arm of mesosome curved outwardly toward the sidepiece giving a wing-like appearance (Figs. 2, 7) ---------- 4

   Subapical lobe with five or six appendages (Figs. 9, 12, 15, 19); base of tenth sternite produced into a long, stout, strongly curved arm (Figs. 11, 14, 17, 21); ventral arm of mesosome, not as above ---------- 5

4. Dorsal arm of mesosome, slender, somewhat pointed, lying at about right angles to the wings of the ventral arms (Figs. 2, 3) ---------- **Culex quinquefasciatus**

   Dorsal arm of the mesosome broad, semicylindrical in appearance, usually with a truncate tip; this arm placed obliquely and extending toward the tip of the ventral arm Figs. 7, 8) ---------- **Culex pipiens**

   (In regions where both of these species are found, intermediate forms have been noted and at times it is difficult to identify positively either of these mosquitoes.)

5. Subapical lobe of the sidepiece with a distinct broad, flattened leaf (Figs. 12, 15, 19) ---------- 6

Leaf of the subapical lobe narrow, little if any wider than the rods; the other appendages of the lobe usually include two stout rods and two slender setae (Fig. 9); tenth sternites terminating in a crown of sharply pointed inner bristles and blunt outer ones (Fig. 11); ventral arm of the mesosome consisting of two median, vertical, blade-like processes; dorsal arm a stout tapering horn which originates from the base; several stout teeth between the two arms (Fig. 10)----Culex tarsalis

6. Mesosomal plate with two arms and with a median row or group of short, fairly stout teeth (Figs. 16, 20)---- 7

Mesosomal plate without a median row of teeth, the processes consisting of a short dorsal arm and a longer ventral arm which has a small tooth near the base (Fig. 13); subapical lobe of the sidepiece with three rods, a leaf, and two setae (Fig. 12)--------Culex restuans

7. Ninth tergite deeply cleft with fairly stout setae arising on the prominent angles (Fig. 18); eighth abdominal segment with a patch of small stout setae, somewhat centrally placed on the apical margin (Fig. 18); mesosomal plate with a stout dorsal arm and a long horn from near the base (Fig. 16); lobe of the sidepiece with a leaf, three rods, and a seta (Fig. 15); several spines on one side of the tuft of the tenth sternite short and bluntly rounded (Fig. 17) ----------Culex nigripalpus

Ninth tergite somewhat rudimentary, the central margin only slightly concave with a row of slender setae along the outer corners (Fig. 22); eighth abdominal segment without a patch of short stout setae; dorsal arm of the mesosomal plate short, bent in the middle at about a right angle, with a pointed tip (Figs. 20, 21); subapical lobe of the sidepiece with three rods, a leaf and two setae (Fig. 19); spines of the tenth sternite all sharp pointed (Fig. 21) ---------- Culex salinarius

8. Subapical lobe of the sidepiece with a distinct division (Figs. 28 32, 33); mesosomal plate with a long, curved basal arm (basal hook), directed ventrally (except in Culex atratus) (Figs. 29, 30, 31) Subgenus Melanoconion 9

(For figures of Culex atratus and the ninth tergite of other Melanoconions, see Roth and Young, 1943.)

Subapical lobe not distinctly divided and bearing two stout rods with curved pointed tips and several shorter serrated and pointed setae; the serrated setae stout and blade-like (Fig. 24); mesosomal plate without a basal hook, the apical end of each studded with small denticles and both halves joined near the top by a transverse bridge (Fig. 25); lobes of ninth tergite two widely separated knob-like elevations each studded with a few small setae (Fig. 27).---Subgenus **Neoculex, Culex apicalis**

9. Apical division of the subapical lobe of the sidepiece with a distinct broad leaf (Figs. 28, 33; Roth & Young, Fig. 1) 10

Apical division of the subapical lobe lacking an expanded leaf but with several rod-like filaments; basal division divided into two subequal arms, each with a long, stout, capitate filament at the tip; apical swelling of the clasper cap-shaped, tapering abruptly and with a hirsute upper margin (Fig. 32); lobes of the ninth tergite finger-like projections from the corners of a broad spicular plate, which has a central oval or irregularly ovate lacuna; one or two smooth setae on each lobe and several grouped on the posterior corners of the plate (Roth and Young, Fig. 7) ---------- **Culex pilosus**

10. Clasper gradually tapered with very little apical swelling (Fig. 28; Roth and Young, Fig. 1) ---------- 11

Clasper greatly enlarged apically with the outer and front margin of the expanded quadrangular portion hirsute, the stem stout and constricted near the middle; basal division of the subapical lobe with one arm bearing a stout filament at the tip and a second filament arising from about the middle of the stem; apical division of the lobe with a very large fan-shaped leaf on a short stem with one long and two shorter stout filaments, plus a fine seta (Fig. 33); lobes of the ninth tergite roughly triangular, approximate, the outer and lower margins and basal portion of each with long, smooth setae arising from conspicuous tubercles (Roth and Young, Fig. 6) ---------- **Culex peccator**

11. Lobes of the ninth tergite ovate, prominent, with numerous smooth setae arising from prominent tubercles; numerous small spicules on the lower base of each lobe (Roth and Young, Fig. 5); apical division of the

subapical lobe with an expanded leaf, a long hooked filament, and several smaller filaments; basal division divided into two subequal arms, each with a long stout, capitate filament at the tip (Fig. 28) ------ **Culex erraticus**

Lobes of the ninth tergite somewhat pear-shaped with a number of barbed setae arising from the basal half (Roth and Young, Fig. 2); basal portion of the subapical lobe with an upper stout rod-like seta and a slender lower one from its base; apical division curved from the base of the basal with a broad ribbed leaf from its tip, behind which arises a stout recurved seta; two conspicuous slender setae arise on the outer side of the apical division each with a smaller, inconspicuous seta from near its base (Roth and Young, Fig. 1); mesosomal plate a stout, curved, simple blade--**Culex atratus**

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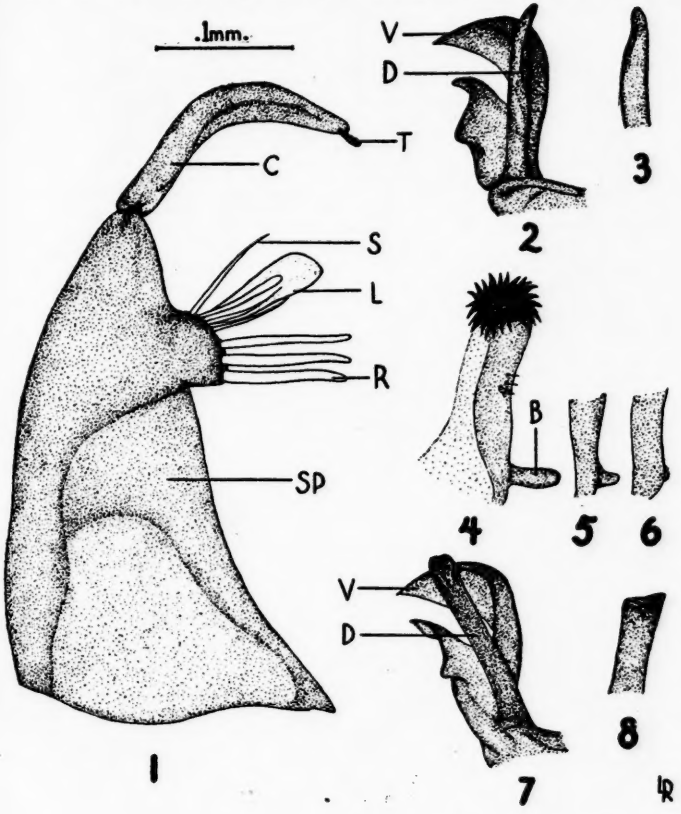
PLATES

(Figs. 1—33)

All figures have been outlined with the aid of an ocular grid. Except for Figs. 25 and 27 only one side of the paired structure has been drawn. The outer [illegible] and pilosity of the sidepieces have not been indicated. The sidepiece itself has been [illegible] the inner surface.



Culex quinquefasciatus Say and **Culex pipiens** L.

Fig. 1. Sidepiece of **C. quinquefasciatus.** (similar in **C. pipiens**). C=clasper; L=leaf; R=Rod; S=seta; SP=sidepiece; T=terminal spine.

Fig. 2. Mesosomal plate of **C. quinquefasciatus.** (dorsal view) D=dorsal arm; V=ventral arm.

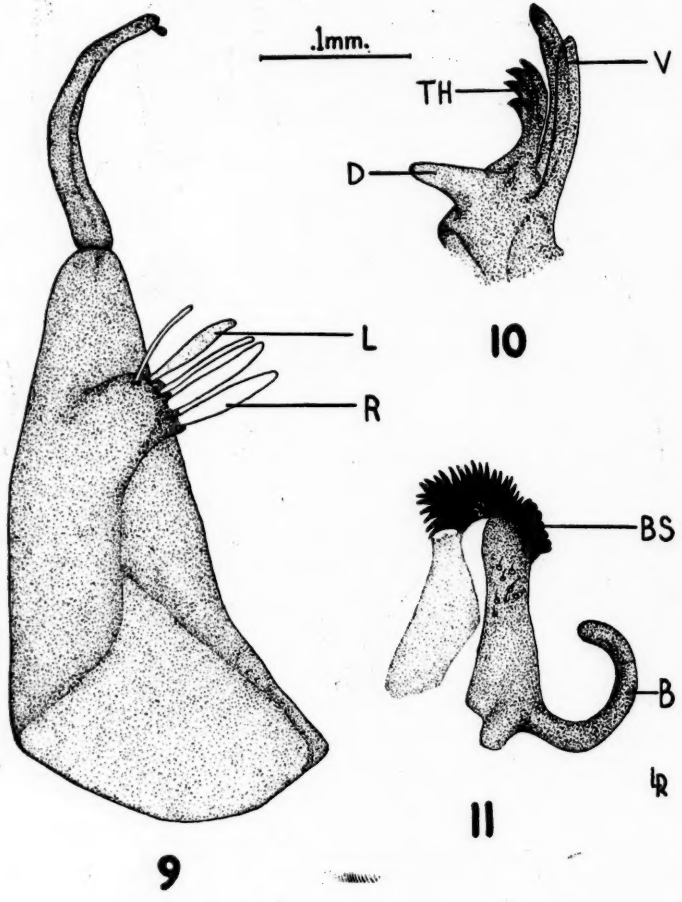
Fig. 3. Apical half of the dorsal arm of the mesosome of **C. quinquefasciatus.** (lateral view)

Fig. 4. Tenth sternite of **C. quinquefasciatus.**. (somewhat similar in **C. pipiens**) B=basal arm.

Figs. 5. 6. Variations in the basal arm of the tenth sternite in **C quinquefasciatus.** (somewhat similar in **C. pipiens**)

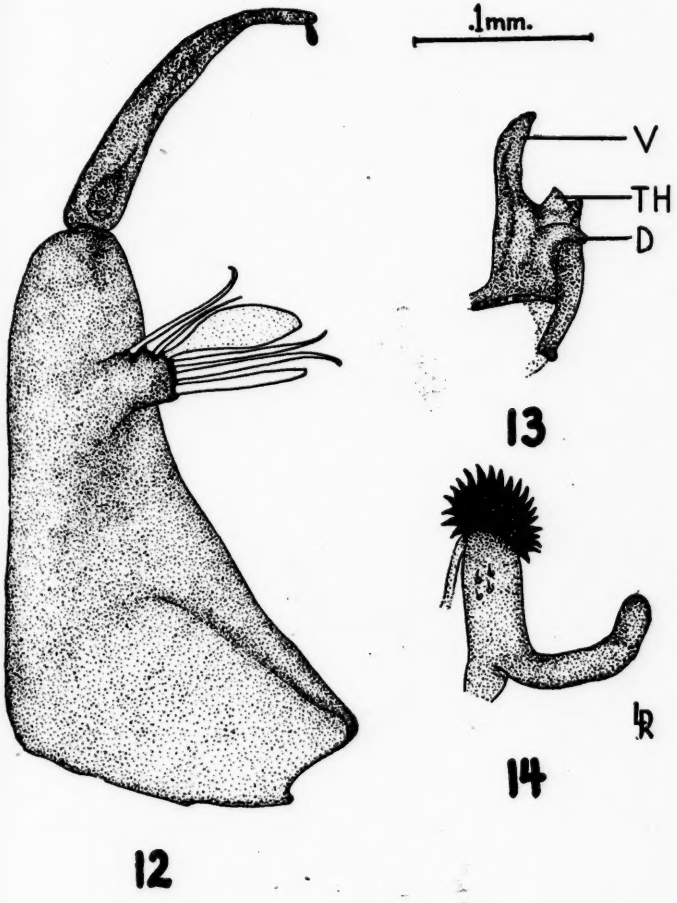
Fig. 7. Mesosomal plate of **C. pipiens**. (dorsal view) D=dorsal arm; V=ventral arm.

Fig. 8. Apical half of the dorsal arm of the mesosome of **C. pipiens.** (lateral view)



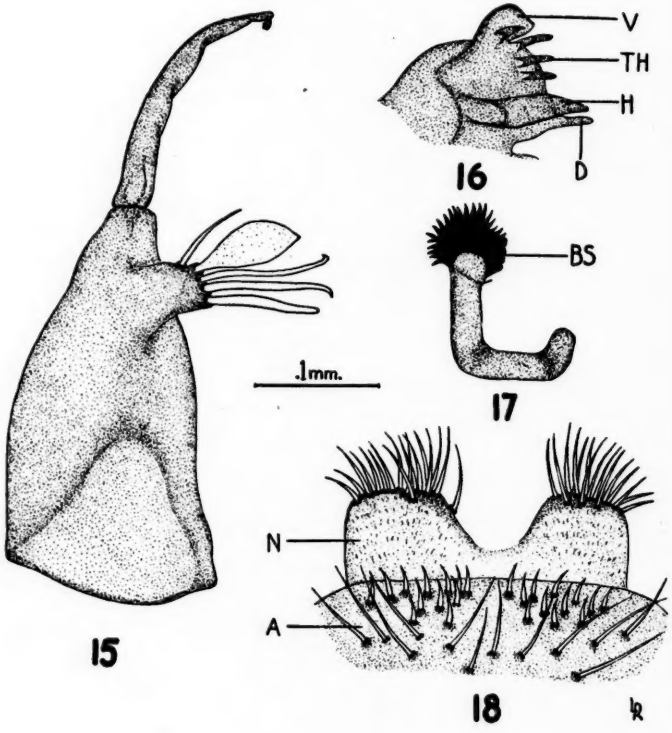
Culex tarsalis Coq.

Fig. 9. Sidepiece. L=leaf; R=Rod.
Fig. 10. Mesosomal plate. D=dorsal arm; TH=tooth; V=ventral arm.
Fig. 11. Tenth sternite. B=basal arm; BS=blunt spine.



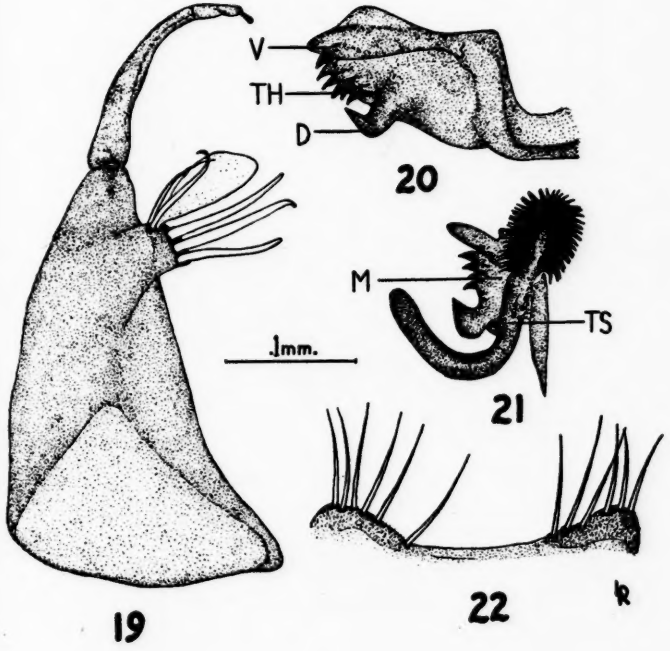
Culex restuans Theob.

Fig. 12. Sidepiece.
Fig. 13. Mesosomal plate. D=dorsal arm; TH=tooth; V=ventral arm.
Fig. 14. Tenth sternite.



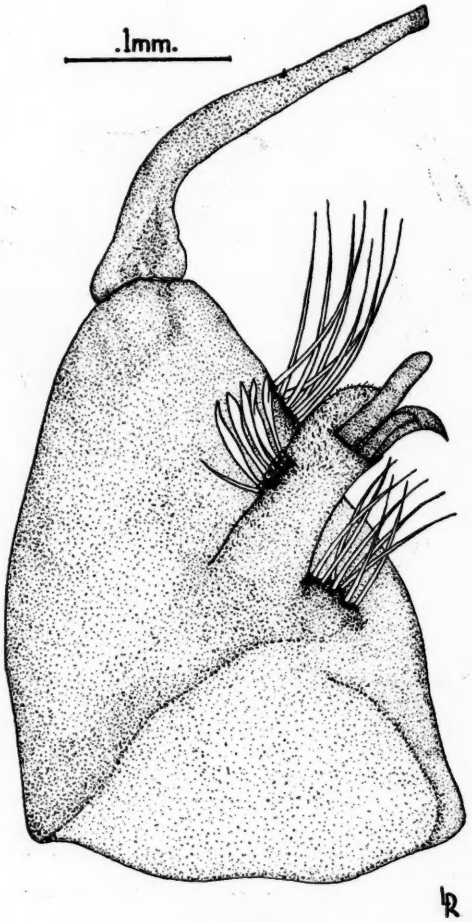
Culex nigripalpus Theob.

Fig. 15. Stipiece.
Fig. 16. Mesosomal plate. (lateral view; inner side). D=dorsal arm; H=horn; TH=tooth; V=ventral arm.
Fig. 17. Tenth sternite. BS=blunt spine.
Fig. 18. Ninth tergite (N) and eighth abdominal segment (A).



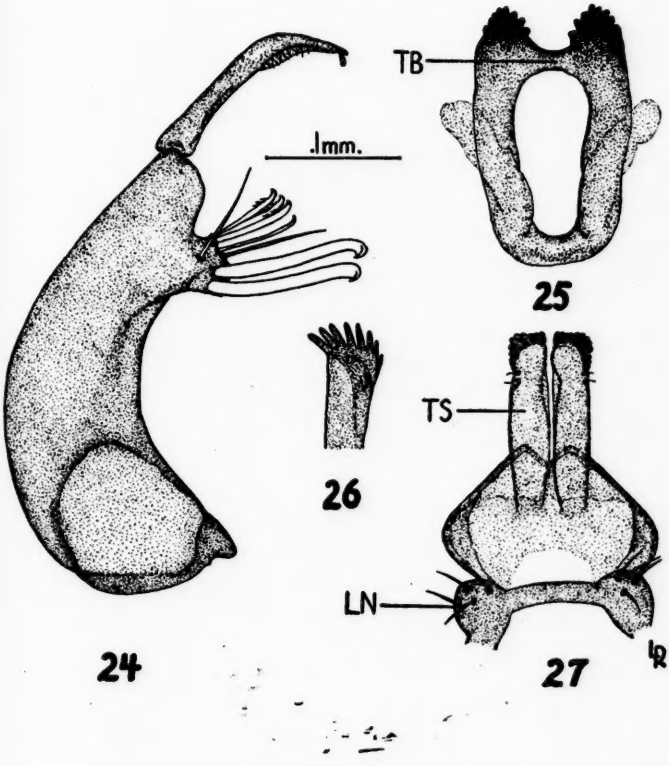
Culex salinarius Coq.

Fig. 19. Sidepiece.
Fig. 20. Mesosomal plate (lateral view; inner side); D=dorsal arm; TH=tooth; V=ventral arm.
Fig. 21. Tenth sternite (TS) and mesosomal plate (M). (dorsal view).
Fig. 22. Ninth tergite.



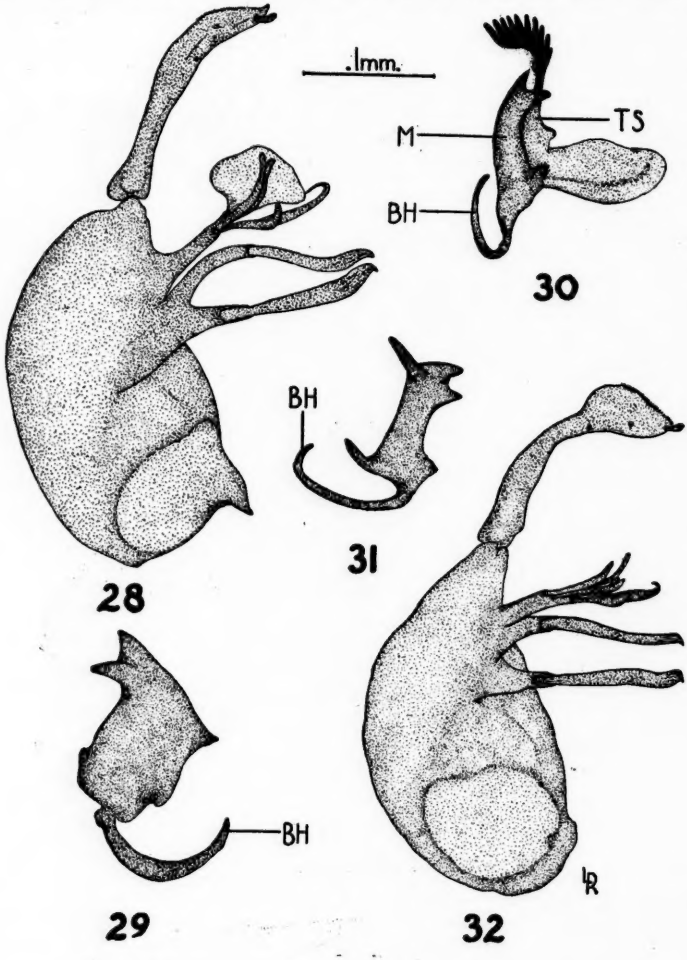
Culex bahamensis D. and K.

Fig. 23. Sidepiece.



Culex apicalis Adams

Fig. 24. Sidepiece.
Fig. 25. Mesosome. TB=transverse bridge.
Fig. 26. Apical half of the tenth sternite. (dorsal view; flattened).
Fig. 27. Tenth sternites (TS) and ninth tergite. LN=lobe of ninth tergite.



Culex erraticus D. and K. and **Culex pilosus** (D. and K)

Fig. 28. Sidepiece of **C. erraticus.**

Fig. 29. Mesosomal plate of **C. erraticus.** (lateral view); BH=basal hook.

Fig. 30. Tenth sternite (TS) and mesosomal plate (M) of **C. erraticus.** BH=basal hook. (dorsal view).

Fig. 31. Mesosomal plate of **C. pilosus.** lateral view). BH=basal hook.

Fig. 32. Sidepiece of **C. pilosus**

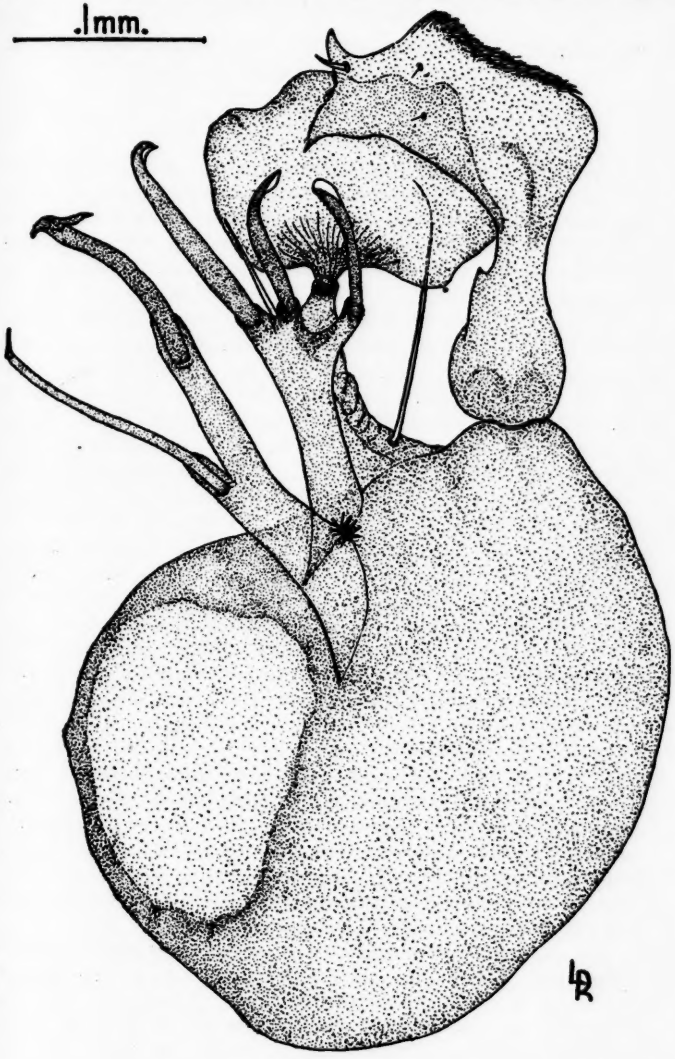


Fig. 33. Sidepiece. **Culex peccator** D. and K.

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A NEW SUBFAMILY OF STAPHYLINIDAE, THE PULICOMORPHINAE (COLEOPTERA)

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The staphylinid tribe Pulicomorphini is raised to the rank of subfamily, pulicomorphiae, and includes two genera of small beetles **Pulicomorpha** Mann and **Beyeria** Fenyes. The species in these genera are of peculiar form resembling ants, or fleas, or wingless Proctotrupoidea, especially species of the genus **Lagynodes.** One species is known to occur with ants.

The genus **Beyeria** was proposed for **B. vespa** Fenyes (1910) collected in the Rincon Mountains in Arizona. Fenyes assigned this genus to the subfamily Aleocharinae without considering the conical shape of the hind coxa. He also believed **vespa** to have a 5-5-5 tarsal formula and placed **Beyeria** in the tribe **Aleocharini.** Later (1921) he segregated a group of Aleocharini, possessing 4-segmented maxillary palpi, under the new tribe Oxypodini, and included **Beyeria** However, the hind coxae of **Beyeria** are not transverse and flattened, as in the Aleocharinae, and examination of a male and female **vespa** from the original series proves the front tarsus to be 4-segmented.

Pulicomorpha was proposed for **P. coecum** Mann (1924), a species of blind staphylinid collected by Wm. Mann in a colony of ants at La Palma Davila in Lower California. This genus was placed in a new tribe, Pulicomorphini, in the Aleochorinae without any discussion of its conical hind coxae. Mann placed it near the tribe Thamiaraeini on the statement that the labial palpus was 2-segmented. However, Mann did not consider the palpiger as a true segment of the palpus, so that as conventionally used in coleopterous descriptions, the palpus is 3-segmented. This removes it from a position near the Thamiaraeini. **Pulicomorpha** was compared with **Beyeria** by Mann, and among other differences, he mentioned that they were unlike in tarsal segmentation and the number of segments of the labial palpus. These characters are actually the same in the two genera, and they possess additional features that associate them closely and remove them from any known subfamily of Staphylinidae.

The subfamilies of Staphylinidae have been distinguished chiefly on the basis of coxal characters and the position of the antennal bases. The posterior coxae may be conical, triangular, transverse, or globose, and the antennae may be inserted at the sides of the front, at front margin of the front, or between the eyes. The Pulicomorphinae differs from the Aleocharinae chiefly on the basis of the conical instead of transverse posterior coxae. It does, however,

have the 4-5-5 tarsal formula in common with the aleocharine tribe Myrmedoniini, a character heretofore recorded for no other group of Staphylinidae outside the Aleocharinae. The Pulicomorphinae also have the antennae situated between the eyes as in the Aleocharinae. From the Paederinae, the Pulicomorphinae differs chiefly in the 4-5-5 formula, and the insertion of the antennae between the eyes. The Paederinae usually have the tarsi 5-segmented, and the antennae are inserted on the sides of the front. Both Paederinae and Pulicomorphinae have the posterior coxae conical.

In addition to the characters indicated to distinguish the Pulicomorphinae from its close allies, the Aleocharinae and Paederinae, the following combination of characters will aid in distinguishing it from other subfamilies.

Pulicomorphinae new subfamily

Body, with exception of abdomen, laterally compressed. Abdomen somewhat depressed with basal segments narrowed and constricted to form a "gaster-like" structure; remainder of abdomen suddenly swollen and much wider than contiguous elytra. Species dimorphic. All coxae conical, and generally long and prominent; posterior coxae contiguous at base, middle coxae contiguous or separated, anterior coxae cavities separated but coxae may be contiguous near apices. Antenna 11-segmented, inserted on front close to eye and just behind front margin of eye. Legs slender, posterior leg equal in length to entire body. Tarsal formula 4-5-5. Maxillary palpi 4-segmented, labial palpi 3-segmented. Mandibles simple or with very slight swelling on inner margins. Genae and sides of pronotum unmargined.

So far as known, the only genera that constitute this new subfamily are **Pulicomorpha** and **Beyeria.** They possess all of the subfamily characters in common but differ from each other in several important respects.

Key to Genera of Pulicomorphinae

Eyes absent; middle coxae contiguous; intermediate antennal segments transverse; gaster horizontal ---------- **Pulicomorpha**

Eyes present; middle coxae separated; intermediate antennal segments quadrate; gaster apparently can be elevated to vertical position ---------- **Beyeria**

Pulicomorpha Mann

The genotype and only species in the genus, **Pulicomorpha coecum** Mann, was described from a series of males and females collected at La Palma Davila, Lower California, in a colony of **Eciton peninsu-**

laris Mann beneath a stone near a water hole. The length given for the female was 1.5 to 1.75 mm., and for the male, 1-1.25 mm. According to Mann, **Pulicomorpha** added a new category to resemblance to inquilinous insects in that it was dimorphic, "the stouter bodied, larger sized female with its short and thick head, and the more slender, smaller male, with long head, corresponding to the major and minor workers of **Eciton californicum.**" In addition to the absence of eyes, **P. coecum** is further described as having the coxae contiguous, intermediate antennal segments transverse and gaster horizontal. Presumably the hind wings are absent.

Beyeria Fenyes

Beyeria vespa Fenyes has remained, until now, the only species in the genus **Beyeria.** The discovery of a second species, from the Ozark Mountain region in Arkansas, necessitates a redescription of the genus. In addition to the description of the new species, vespa is recharacterized, and illustrations are presented to aid in separating the two. I am indebted to Mr. Howard Notman for the privilege of studying a pair of **vespa** that he had from the original collection.

Body ant-like in form and straw yellow in color. Head longer than wide, with a deep and extensive depression between the eyes. Gena longer than eye and narrowed to neck. Antenna slightly elbowed at end of first segment, 11-segmented, about three and one-half times longer than width of head across eyes, inserted on front of head just behind anterior margin of eye; first segment a little more than twice as long as wide, second segment shorter and narrower than first, fourth to tenth segments as wide as third at apex and each nearly quadrate, eleventh segment longer than tenth. Labrum transverse, slightly emarginate in front. Mandibles simple and with at most a slight swelling on the inner margin. Maxillary palpus 4-segmented (Fig. 14); lacinia shorter than galea, inner margin clothed with dense fringe of setae which become coarser and tooth-like toward apex; galea with brush of setae covering only the apex; first segment of palpus nearly quadrate, second twice as long as first, apex more than twice as wide as its base, third segment as wide as second, two to three times longer than its width, fourth segment about four times longer than wide, one-third the width of third segment and about one and one-half times longer than the third segment is wide. Mentum transverse, widened posteriorly, emarginate in front, and with anterior angles prominent; labial palpus 3-segmented succeeding segments narrowed, first two segments about twice as long as wide, third about four times longer than wide and two-thirds width of second. Pronotum longer than wide, narrowed

toward front, equal in width to head, and about equal in length to head; sides evenly rounded and unmargined, hind angles rounded; front coxal cavities open behind; spiracles concealed from the side and apparently attached to the end of the free lying and very lightly sclerotized epimeron; prosternum widely separating the coxal cavities, although coxae may be contiguous, and distinctly keeled. Mesosternum shorter than metasternum, meeting the metasternum between the middle coxae and rounded or truncate behind; middle coxae separated by a distance from one-half to the width of coxa. Hind coxae contiguous at base. Elytra wider than pronotum and slightly longer, evenly curved on disc then more sharply rounded to the nearly perpendicular sides; each elytron about twice as long as wide. Wings present. Legs very long and slender, the posterior ones equal in length to entire body. Tarsal formula 4-5-5. Abdomen constricted at base and suddenly enlarged near middle of third segment or gradually enlarged from base; enlarged part of abdomen slightly longer than wide, margined, slightly convex on the dorsum and strongly curved on venter; eighth sternite apparently sexually unmodified. Antennae, tarsi, and tibiae more densely clothed with yellowish setae than remainder of body.

The abdomen is "hinged" between the secnod and third segments and in life the beetle can probably elevate it to a vertical position. Considering the peculiar form in this genus, it is not improbable that the species may live in ant nests.

Genotype: **Beyeria vespa** Fenyes.

Beyeria pulex new species

The abbreviated groove on the head, shorter third antennal segment, rounded anterior pronotal angles, ungrooved pronotum, and more sharply pointed prosternum will readily separate this species from **vespa** Fenyes. In **pulex** the third abdominal segment is similar in both sexes.

Male:—Length, with head deflexed, 2.5 mm. Color almost uniformly straw-yellow, eyes and apices of mandibles only darker. Head, from front margin of clypeus to constriction of neck, one-fifth longer than width across eyes. Frontal groove ending on vertex a little beyond a line through hind margins of eyes. Side of head behind eye about one and one-half times length of eye, nearly parallel for half the length and gradually rounded to constriction. Neck swollen, slightly transverse, and width equal to one-half width of head behind eyes. Third antennal segment (Fig 10) subequal in length to second segment, eleventh about one-third longer than tenth. Third

segment of maxillary palpus (Fig. 7) one third longer than second or fourth segments. Mentum (Fig. 3) deeply and broadly emargina.e anteriorly, emargination equal to one-fourth length of mentum; sides nearly parallel in apical third then strongly expanded and rounded to the nearly truncate base. Gular sutures converging at middle of head. Pronotum nearly one and one-half times longer than wide; sides slighdly convergent in basal three-fifths then almost sharply narrowed and straight to apex which is one-half greatest width of pronotum; front margin slightly rounded; front angles of pronotum, seen from side, evenly rounded. Prosternum strongly and entirely keeled and pointed behind. Elytral emargination at apex about one-sixth of length of elytra from line through apices to apex of scutellum. Pronotum and elytra provided with shallow setae bearing punctures, punctures separated from once to twice their diameters. Mesosternal process flattened, broadly joining metasternum, subtruncate behind, and equal in width to diameter of middle coxa. Second abdominal tergite a little longer than wide, constricted near base, then suddenly and broadly elevated and rounded in posterior half. Third tergite with an evenly rounded and recurved process that extends beyond posterior margin of second tergite. Second abdominal sternite (Fig. 1) firmly joined to third sternite, as long as greatest width of hind trochanter and regularly rounded. Third abdominal sternite (Fig. 1), viewed from lateral aspect, four times broader at posterior margin then at base where it is narrowed and has a forward pointing dorsal projection joined to second sternite. Abdomen smooth and shining, about one and one-third times width of body across elytra, and sharply pointed behind. Trochanter of hind leg about twice as long as wide. Ratio of tarsal segments beginning with basal segment—anterior, 3-4-4-8, middle, 6.5-6.5-6.5-5.5-9; posterior, 15-11-10-8-11.

Genitalia as in figure 13. Aedeagus three times longer than wide, broadest and rounded at base with sides near base a little angulate; sides behind angles nearly parallel then convergent and nearly straight sided to rounded apex in apical one-sixth.

Female—Length, color, and external structure same as for male, and separated from that sex by its broader abdomen which is nearly twice as wide as width of body across elytra. Bursa copulatrix as in figure 8 consisting of a bulbous swelling at either end of a narrow, recurved and nearly parallel sided tube.

Holotype, male:—Fayetteville, Arkansas: May 22, 1941, at liggt. Milton W. Sanderson.

Allotype, female:—same data as for holotype.

Paratypes:—Arkansas:—Fayetteville: July 24, 1940 1♂; 1941-April 30, 1♂; May 22, 1♀; May 23, 1♀; May 24, 1♀; May 25, 2♂; May 28, 1♀; May 30, 3♀; May 31, 1♂; June 6, 2♂; July 4, 1♂; July 26, 1♀; July 28 1♀; July 29, 1♀; October 24, 1♀. 1942—May 10, 1♀; May 13, 1♀; May 21, 1♀; May 31, 1♂; June 1, 1♀; June 5, 2♂; June 9, 1♀; June 10, 1♂; June 11, 1♂; June 17, 1♀; June 27, 1♀; July 3, 1♀; July 14, 1♀. All paratypes collected at light. Milton W. Sanderson.

The holotype, allotype, and paratypes are deposited in the collection of the Illinois Natural History Survey. Additional paratypes are deposited in the collections of the University of Kansas, United States National Museum, Howard Notman, C. A. Frost and C. H. Seevers.

Beyeria vespa Fenyes

The entire frontal groove, longer third antennal segment, distinct anterior pronotal angles, grooved pronotum, and less strongly produced posterior prosternal margin will distinguish this species from **pulex** Sanderson. The third abdominal segment is more bulbous in the female than in the male. This species is also a little larger than **pulex**.

Male:—Length, with head deflexed, 3.2 to 3.5 mm. Color, dark straw yellow, eyes and apices of mandibles darker. Head, from front margin of clypeus to constriction of neck, one-fifth longer than width across eyes. Frontal groove extending full length of head although shallow and narrowed posteriorly. Side of head behind eye one and one-half times length of eye, and triangularly convergent to constriction. Neck scarcely swollen, transverse, width equal to one-half width of head behind eyes. Third antennal segment (Fig. 11) nearly one and one-half times longer than second; eleventh twice as long as tenth. Third segment of maxillary palpus (Fig. 6) twice as long as second or fourth segments. Mentum (Fig. 5) shallowly emarginate anteriorly; sides rather suddenly constricted at apical one-eigth behind prominent front angles, then enlarged and rounded to distinct angles in basal one-third; base of mentum rounded from angles and somewhat flattened on lower margin; a large depression on either side of middle and in posterior half equal to about one-fourth greatest width of mentum. Gular sutures diverging at middle of head. Pronotum one and one-third times longer than wide; sides parallel in basal two-thirds then slightly convergent and parallel to apex; apex two-thirds greatest width of pro-

notum; anterior margin distinctly rounded in middle three-fourths; posterior margin evenly curved from rounded angles; anterior angles of pronotum, seen from side, nearly right angled; pronotum with a deep groove laterally on the side equal to about one-third pronotal length. Prosternum keeled between front coxae and slightly pointed behind. Elytral emargination at apex very shallow and about one-eighteenth length of elytra from line through apices to apex of scutellum. Pronotum and elytra provided with shallow saetae bearing punctures, the punctures much more distinct on elytra and separated from once to several times their diameters. Mesosternal process flattened, slightly rounded posteriorly where it joins the rounded anterior margin of metasternum; intercoxal space equal to about one-half width of middle coxa. Second abdominal tergite slightly more than one and one-half times longer than wide, nearly parallel in basal half then widened and nearly parallel in apical one-half; disc slightly convex and not elevated posteriorly; a distinct sinuation at each posterior angle; posterior margin nearly truncate. Third tergite with base recurved and evenly rounded. Second abdominal sternite (Fig. 4) firmly joined to third; second sternite one-third width of hind trochanter and transversely carinate near third sternite. Third sternite (Fig. 4) viewed from lateral aspect, twice as broad at posterior constriction as at narrowed base just behind the small, quadrate, vertical projection. Abdomen smooth and shining and sparsely provided with suberect to erect yellow setae varying in length. Trochanter of posterior leg one and one-half times longer than wide. Ratio of tarsal segments beginning with basal segment—anterior, 5-5-3.5-8; middle, 8-6-5-4-9 posterior, 14-9-7-5-10.

Genitalia as in figure 12. Aedeagus two and one-third times longer than greatest width, nearly circularly rounded in basal half then narrowly prolonged into a process about one-third to one-fourth as wide as basal swelling, and slightly narrowed to rounded point.

Female:—Length, color, and most external features same as for male except as follows: third sternite (Fig. 2) viewed from lateral aspect, one and one-half times broader before posterior constriction than at base; vertical projection twice as long as high. Bursa copulatrix as in figure 9. Tube contorted at either end, nearly parallel sided and with one end formed into an enlarged apically narrowed, and U-shaped hook; side angulate below hook.

Four specimens of this species were collected in the Rincon Mountains in Arizona, 5000 feet above sea level, July 1907, Gustav Beyer. According to Fenyes, apparently quoting Beyer, "the beetles came to the camp-light with a number of wasps of the same size and

color, the two insects being scarcely distinguishable when on wing." Type and a second specimen in the collection of the California Academy of Sciences. The two remaining specimens of the original series are a male and female in the collection of Howard Notman, Long Island, New York.

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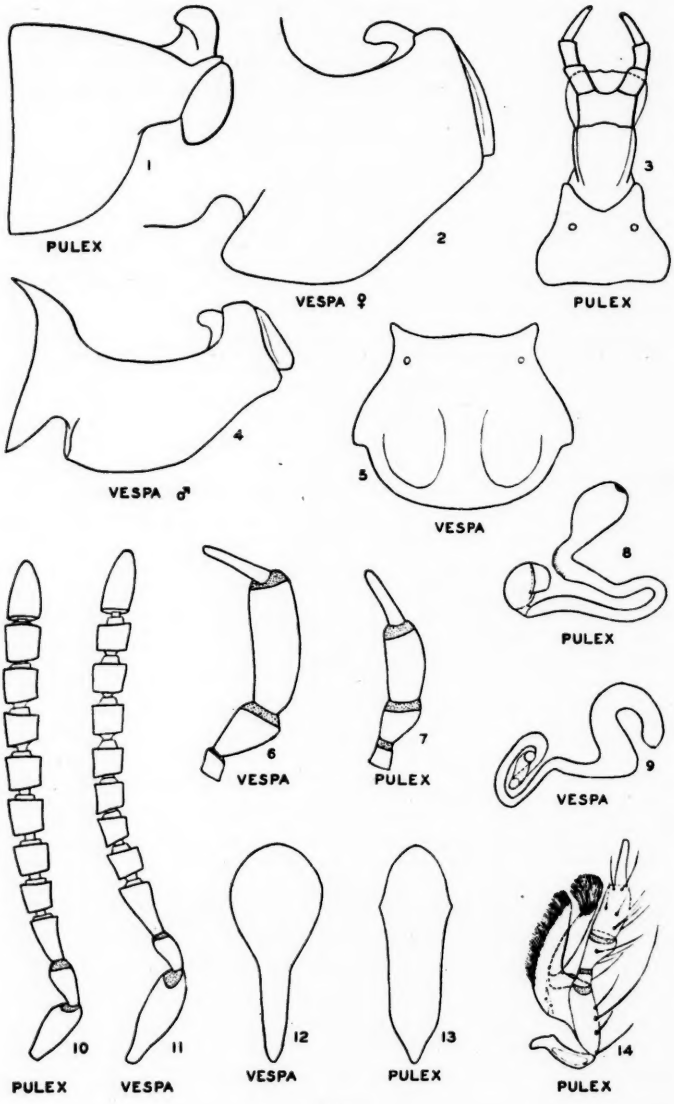
EXPLANATION OF PLATE.

Fig. 1. **Beyeria pulex** n. sp. Lateral view of second and third abdominal sternites of female.
Fig. 2. **Beyeria vespa** Fenyes. Lateral view of second and third abdominal sternites of female.
Fig. 3. **Beyeria pulex** n. sp. Labium of female.
Fig. 4. **Beyeria vespa** Fenyes. Lateral view of second and third abdominal sternites of male.
Fig. 5. **Beyeria vespa** Fenyes. Mentum of female.
Fig. 6. **Beyeria vespa** Fenyes. Right maxillary palpus of female.
Fig. 7. **Beyeria pulex** n. sp. Right maxillary palpus of female.
Fig. 8. **Beyeria pulex** n. sp. Bursa copulatrix
Fig. 9. **Beyeria vespa** Fenyes. Bursa copulatrix.
Fig. 10. **Beyeria pulex** n. sp. Left antenna of female.
Fig. 11. **Beyeria vespa** Fenyes. Left antenna of female.
Fig. 12. **Beyeria vespa** Fenyes. Aedeagus.
Fig. 13. **Beyeria pulex** n. sp. Aedeagus.
Fig. 14. **Beyeria pulex** n. sp. Right maxilla of female.


1
PULEX
2
VESPA ♀
3
PULEX
4
VESPA ♂
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VESPA
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VESPA
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SEASONAL ABUNDANCE AND DISTRIBUTION OF LARVAE OF THE CLEAR LAKE GNAT

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The economic importance of the Clear Lake gnat, **Chaoborus astictopus** D. and S., near the shores of Clear Lake was recorded by Herms (1937). Adult habits and emergence from the lake were reported by Lindquist and Deonier (1942). This paper gives information on the distribution, abundance, and seasonal habits of the larvae, which has been obtained from a study of thousands of mud samples taken from the bottom of Clear Lake, Lake County, Calif. over a period of 3 years.

Fifteen collecting stations appromimately three-fourths mile apart were established from shore to shore on the upper arm of the lake, nine stations on a line running north and south, line A, and six stations on a line running east and west, line B (Fig. 1). At each station three mud samples were taken twice a month throughout the year. Samples were also taken at numerous places on the southern end of the lake.

Methods:—A standard 6-inch Ekman dredge was used in taking the bottom samples. The mud samples were seived through a 50-mesh screen, which allowed the mud to pass through but retained all except the smallest larvae. The larvae were then washed into pint jars and taken to the laboratory for counting.

Bottom water temperatures were recorded when samples were taken. Likewise, the turbidity of the water was tested with a white disk, 10 cm. in diameter, known as a Secchi disk.

Temperature and Turbidity of Water in Clear Lake:—The bottom of the northern arm of Clear Lake is saucer-shaped, with the greatest depth about 30 feet. There is no thermocline, and the water is comparatively warm during winter (Table 1). The temperature of the water is uniform over the greater part of the lake. The area within one-fourth mile of the shore, however, may be 1 to 3 degrees warmer or colder than the middle, depending on air temperature and storms.

There was very little difference in turbidity between the stations, but occasionally the water would be clearer in the middle of the lake.

Table 1:—Average bottom-water temperatures and relative turbidity of water at stations in line A throughout the 3-year period.

Date	Temperature, °F			Relative Turbidity as indicated by Inches in Water at which Secchi Disk Could Be Seen.		
	1939	1940	1941	1939	1940	1941
Jan. 10	48.1	50.0	48.0	14.2	14.0	10.8
Jan. 25	47.6	49.1	49.1	16.4	18.2	10.9
Feb. 10	45.3	51.4	49.2	15.7	18.7	7.9
Feb. 25	48.7	50.0	51.8	20.6	14.2	9.6
Mar. 10	50.4	53.0	51.5	17.3	5.7	7.9
Mar 25	52.0	55.5	53.8	27.2	17.2	11.8
Apr. 10	57.4	56.3	55.3	14.1	15.9	12.3
Apr. 25	59.4	60.8	56.3	15.4	21.6	27.3
May 10	62.2	62.3	61.7	18.2	16.9	27.7
May 25	65.2	68.3	65.2	16.0	41.7	34.3
June 10	68.6	69.1	67.0	14.4	26.7	32.7
June 25	70.1	72.0	68.3	19.2	72.1	14.1
July 10	74.3	78.0	69.4	26.9	30.2	54.2
July 25	76.2	77.7	79.0	27.7	48.9	71.0
Aug. 10	78.1	77.7	77.2	21.0	37.8	75.8
Aug. 25	74.2	76.6	72.9	12.6	22.6	20.7
Sep. 10	71.1	71.6	71.3	11.7	14.0	28.0
Sep. 25	70.3	69.0	66.0	18.7	15.0	21.7
Oct. 10	64.1	65.3	64.7	21.8	21.6	15.4
Oct. 25	64.3	65.4	58.7	22.1	24.6	9.6
Nov. 10	59.9	57.9	58.8	19.6	18.3	10.7
Nov. 25	57.1	52.8		15.3	19.8	
Dec. 10	53.8	52.0		16.5	20.9	
Dec. 25	52.2	50.0		18.2	12.4	

The two southern arms were always clearer than the northern end. During January through March in 1940 and 1941 the water was very turbid (Table 1), owing to the heavy load of silt carried by flood waters. Within certain limits the water was clearest from May through July. Compared with many mountain lakes, Clear Lake is fairly turbid the greater part of the time. No correlation has been found between water turbidity and distribution of larvae.

Distribution of Larvae:—Except in shallow water a few hundred feet offshore, larvae were found in numbers at every place where samples were taken. In the southern arms of the lake, where the water was deep, larvae were taken in abundance as near as 100 feet

offshore. No great difference in larval abundance was found between the northern and southern extremities. Although many miles apart, similar depths showed similar numbers of larvae.

Eggleton (1931) refers to seasonal concentration zones or distribution of bottom organisms according to depth of water in Third Sister Lake, Mich. A definite correlation between the water depth and number of **Chaoborus** larvae was found to exist during the greater part of the year in Clear Lake. As an example, from January to March 1941, in 12 to 15 feet of water 32 larvae per sample were taken, in 15 to 20 feet 103 larvae, in 20 to 25 feet 148 larvae, in 25 to 30 feet 185 larvae, and in 30 to 33 feet 242 larvae. At times during the summer the bottom samples in shallow water near shore showed heavy concentrations of immature larvae which had not yet been distributed to greater depths.

A shoreward movement of the overwintering larvae was indicated during the spring, and for a short time the largest populations of mature larvae were taken at stations 500 to 2,000 feet offshore. In May 1939 the station nearest shore at each end of lines A and B averaged 75 larvae per sample, whereas the stations in deeper water averaged 145 larvae. On June 7 it was indicated that the shoreward movement of larvae was beginning, because the two stations nearest the shore at each end of the lines averaged 95 larvae whereas the remaining 7 stations in deeper water averaged only 73 larvae. On June 21 it was evident that the greatest larval population existed near shore because these stations averaged 31 larvae and those in the lake averaged 21. In July and August and throughout the winter the mature larvae were always found in greatest abundance in the deeper parts of the lake. A similar shoreward movement of overwintering larvae was recorded in June 1941.

Bottom samples did not indicate that the pupal population was greatest near shore. Emergence, however, was invariably greater at that point (Lindquist and Deonier 1942). The data strongly showed that some sort of larval shifting, or migration, occured. The reasons for the shoreward movement are not clear.

Concentration of Larvae in Mud:—There was some question as to whether the Ekman dredge penetrated sufficiently deep into the mud to capture all larvae. A specially constructed sampler which could be pushed deep into the bottom, however, showed the heaviest concentration of larvae in the upper 4 inches.

There appeared to be some seasonal differences, but throughout most of the year 84 to 98 per cent of the larvae were in the upper 4 inches. A few larvae were taken 4 to 8 inches below the surface

of the lake floor and a very small percentage 8 to 12 inches. During October through December 1939, 61 per cent of the larvae were taken in the upper 4 inches. It is not known whether the distribution of larvae varies in different types of mud or in different water depths. Since the Ekman dredge penetrated the mud about 5 inches, it is believed that approximately 90 to 95 per cent of the larvae were recovered by the method employed.

Seasonal Abundance:—The average number of larvae and pupae per sample taken on lines A and B twice monthly from April 25, the approximate beginning of adult emergence, to October 25, when the overwintering population reached its peak, is shown in Table 2.

Table 2:—Seasonal abundance of the Clear Lake gnat.

	Average Number of Larvae or Pupae per Sample.		
Date	1939	1940	1941
Apr. 25	189	99	109
May 10	155	92	101
May 25	126	81	61
June 10	85	60	47
June 25	24	168	33
July 10	45	233	26
July 25	53	215	206
Aug. 10	89	189	209
Aug. 25	50	199	105
Sep. 10	59	179	79
Sep. 25	80	134	78
Oct. 10	105	150	81
Oct. 25	[1]251		
Oct. 25	138	187	110

[1]1938

From these data it is evident that great differences in population exist from month to month and from year to year. Weather conditions, more than any other single factor, no doubt account for this variation. The spring and summer reduction of larvae is due mainly to the emergence of adults, which is followed by oviposition and a new crop of larvae. The critical period is from 6 to 10 p. m. daily, when strong winds or temperatures below 55° F. reduce or prevent oviposition. In 1940 a heavy oviposition, due to abnormally warm and calm weather, caused a low spring population to increase to a peak of 233 larvae on July 10, and in 1941 a heavy oviposition during a few days of favorable weather from June 27 to July 2 brought about an increase from 26 larvae per sample on July 10 to 206 on July 25.

Of practical significance is the length of time the overwintering larvae continue to pupate and emerge. At least 67 days in 1939 and 76 days in 1941 were required for the overwintering larvae to emerge, notwithstanding the fact that all of them were in the last instar in April. The length of time required for summer broods to complete development can not ordinarily be computed because of the intermingling of generations. In 1941 weather conditions restricted oviposition largely to the period June 27-July 2. The majority of these larvae emerged between August 10 and 25 after a development period of 6 to 7 weeks. Development in the laboratory can be very rapid (Deonier 1942).

The larval populations during the first part of April showed decreases of 24.7, 28.2, and 41.7 per cent from those found the preceding October. These reductions are due to feeding on the larvae by the various species of fish and to other, unknown causes.

The difference in population between the beginning of the active season and the fall varied, a 27.0 per cent decrease occuring in 1939, an 88.8 per cent increase in 1940, and no change in 1941. It is evident that the insect was not able to increase beyond certain limits during the summer. For instance, the large population in July 1940 did not increase, and in fact could not maintain the same level, even when the weather appeared favorable for oviposition.

The number of larvae taken per sample at each of the stations on selected dates during 1941 is recorded in Table 3. Variations at a station were frequent during the winter, but on the whole the number of larvae recovered on a line was consistent. Because of water currents some shifting of larval population is to be expected. The average number of larvae taken per sample for the period January-March 1941 is given in figure 1.

It is difficult to estimate the total number of larvae in the lake at any one time, but during the fall of 1938 a population of 800 billion was considered a reasonable approximation.

Summary:—According to bottom samples taken with an Ekman dredge in Clear Lake, Lake County, Calif., larvae of the Clear Lake gnat were found well distributed in the lake except in shallow water near shore. A gradual increase of larvae was found from shallow to deep water during the year except for a short period in the spring, when mature overwintering larvae concentrated near shore, and in the summer, when immature larvae occasionally became abundant near shore.

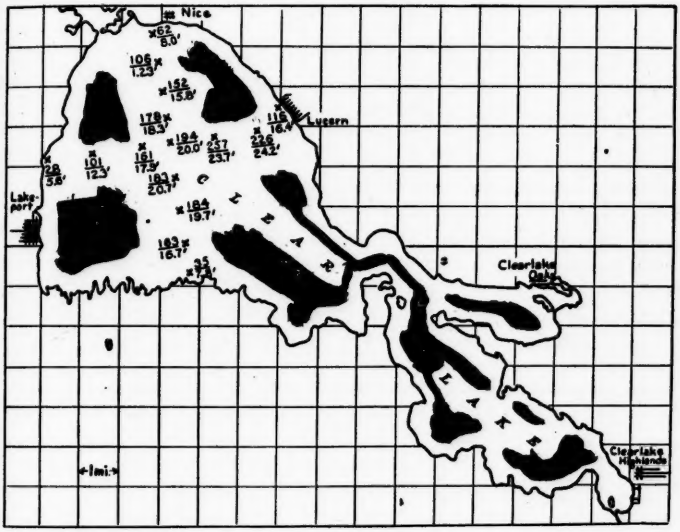
Table 3:—Larval abundance at the various stations in 1941:

Number of Larvae per Sample

Station	Apr. 8 (Overwintering Population)	July 7 (Spring Minimum)	Aug. 11 (Summer Peak)	Oct. 7 (Fall Minimum)	Oct. 29 (Fall Peak)
Line A:					
1.	45	14	179	53	40
2.	49	13	144	100	55
3.	76	33	317	95	151
4.	169	21	207	88	156
5.	183	19	271	95	163
6.	160	14	223	45	157
7.	167	17	290	61	145
8.	175	23	99	112	107
9.	32	49	92	28	68
Line B:					
1.	56	58	164	115	63
2.	176	36	356	130	168
3.	186	18	320	104	191
4.	132	33	234	80	115
5.	61	24	166	68	52
6.	17	22	72	47	16

From 84 to 93 per cent of the larvae were found in the upper 4 inches of bottom mud most of the year and a small percentage penetrated as deep as 12 inches.

Great seasonal differences in population existed, ranging from an average of 251 larvae per 6 square inches in October to 24 in June. Yearly differences were also evident. The overwintering population showed a decrease of 24.7 per cent in 1939, 28.2 per cent in 1940. and 41.7 per cent in 1941.



NOTE:—The figures 1.23 near the top of plate should be 12.3

Fig. 1:—Average number of **Chaoborus** larvae per sample taken at collecting stations on lines A and B, January through March 1941, toge.her with water depths at zero (low water level), Rumsey gauge readings.

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ADDITIONS TO THE SOUTH DAKOTA LIST OF HEMIPTERA

HALBERT M. HARRIS

In a previous study 224 species of Hemiptera, exclusive of the Miridae and Corixidae were recorded from South Dakota[1]. The present report adds 30 additional species, indicated in the list below with the asterisk, and gives collection data on certain species which were tabulated without such in the other paper. As before, I am indebted to Professor Harry C. Severin whose diligent collecting and friendly interest have made the studies possible.

Family SCUTELLERIDAE

Euptychodera corrugata V. D.* Belle Fourche, July 6, 1941, N. P. Larson.

Family THYREOCORIDAE

Galgupha ovalis Hussey. * Englewood, June 18, 1925, H. C. S.

Galgupha lobostethia Sailor. * Whitewood, June 8, 1923, G. I. Gilbertson.

Cydnoides albidipennis (Say). * Yankton, Sept. 27, 1923, H. C. Severin.

Family PENTATOMIDAE

Brochymena arborea (Say). * Yankton, Sept. 27, 1923, H. C. Severin.

Mecidea longula Stal. * Capa, Aug. 15, 1922, H. C. S.

This form is larger than specimens from Texas, and its third antennal segment is noticeably longer than the fourth.

Thyanta acerra McAtee. * Sandhills, Martin, Sept. 3, 1923, H. C. S.

Thyanta punctiventris Van Duzee. * Chamberlain, July 24, 1940, under lights, H. C. S.

Acrosternum hilare (Say). Canton, Aug. 28, 1923, H. C. S.

Apateticus bracteatus (Fitch). Lake Hendricks, Aug. 17, 1923, H.C.S.

Perillus circumcintus Stal. * Buffalo, Aug. 29, 1924, H. C. S.

Family COREIDAE

Mozena obesa Montandon. * Chamberlain, Aug. 31, 1923, H. C. S.

Family CORISCIDAE

Coriscus tomentosus (Fracker). * Newell, Aug. 31, 1922, H. C. S.

Tollius quadratus Van Duzee. * Custer Peak, July 29, 1939, N. F. Larson.

Family RHOPALIDAE

Arhyssus scutatus (Stal). Lead, Aug. 2, 1935. This is the species previously listed as **Corizus sp.**

Arhyssus indentatus (Hambleton). * Piedmont, May 1, 1941, H. C. S.; Belle Fourche, July 6, 1941, N. P. L.

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[1]Iowa State College of Science, XI:169-176. 1937.

Family ARADIDAE

Aneurus inconstans Uhler. * Fairfax, June 22, 1924, H. C. S.

Family NEIDIDAE

Jalysus wickhami Van Duzee. * Black Hills, June 28, 1937, H. M. H.

Family LYGAEIDAE

Blissus leucopterus (Say). Fairfax, Aug. 8, 1924, H. C. H.

Perigenes similis Barber. * Brookings, July 12, 1942, H. C. S.

Zeridoneus costalis (V. D.). Whitewood, Aug. 29, 1927, H. C. S.

Pseudocnemodus canadensis (Prov.). Hot Springs, Aug. 27, 1922, H. C. S.

Peritrechus saskatchewanesis Barber. * Chester, July 26, 1930; Chamberlain, July 24. 1940, H. C. S.

Drymus crassus Van Duzee. * Whitewood, Sept. 9, 1923, H. C. S.

Eremocoris ferus Say. * Yankton, June 20, 1924, H. C. S.

Scolopostethus thompsoni Reuter. * L. Hendricks, July 23, 1922, H. C. S.

Uhleriola floralis (Uhler). Newell, Aug. 26. 1924, H. C. S.

Family PHYMATIDAE

Phymata vicina Handlirsch.* Black Hills, June 28, 1937, H. M. Harris.

Family REDUVIIDAE

Oncocephalus nubilus Van Duzee. * Chamberlain, June 18, 1940, G. B. S.

Zelus exsanguis Stal. * Rapid Ciey, July 24, 1923, H. C. S.; Brookings, Sept. 18, 1923, H. C. S.

Family NABIDAE

Nabis sordidus Reuter. * Yankton, June 20. 1924, H. C. S.

Nabis annulatus Reuter. * Bigstone, Aug. 20, 1924, H. C. S.

Nabis propinquus Reuter. * Waubay, Aug. 21, 1924, H. C. S.; Bigstone, Aug. 20, 1924, H. C. S.

Family ANTHOCORIDAE

Lyctocoris campestris Fabr. * Vermillion, October 22, 1940, H. C. S.

Xylocoris sordidus Reuter. * Brookings, Aug. 20. 1942, H. C. S.

Family HYDROMETRIDAE

Hydrometra martini Kirkaldy. * Burke, June 11, 1940, H. C. S.; Elk Point, Aug. 20, 1940, G. B. S.

Family GERRIDAE

Gerris notabilis D. & H. * Black Hills, Rousseau Lake, June 22, 1940, H. C. S.

Gerris insperatus, D. & H. * Wood, July 23, 1939, H. C. S.; Smithwick, June 21, 1940, H. C. S.

Gerris comatus mickeli D. & H. * Larive Lake, June 22, 1940, H. C. S.

Family VELIIDAE

Microvelia buenoi Drake. * Brookings, May 11, 1939, H. C. S.

Rhagovelia rivale Torre-Bueno. * Rosebud, Little White River, Sept. 14, 1940, G. B. S.

Family SALDIDAE

Pentacora signoreti (Guerin). * Waubay Refuge, June 22, 1940, H.C.S..

Salda buenoi McDunnough. * L. Oakwood, June 14, 1923, H. C. S.; Lake Andes, June 14, 1940, H. C. S.

Saldula confluenta Say. * L. Hendricks, July 12, 1922, H. C. S.; Brookings, July 5, 1940, H. C. S.

Saldula severini, n. sp.

Closely related to **S. orbiculata** (Uhler) and strongly resembling that species in color and vestiture, but much smaller, more elongate-oval in shape, with the lateral edge of pronotum almost straight, not convexly arcurate as in **orbiculata**, and legs with shorter, less erect hairs.

Narrowly oval, deep black, the head, pronotum and scutellum shiny, hemelytra duller, with pale areas, the basal antennal segments and legs testaceous; upper surface thickly clothed with long, erect dark hairs, also fine, prostrate, pale, in part golden, pubescence. Head with front almost vertical, the brownish hairs projecting conspicuously; tylus pale; vertex with a pale point each side between ocellus and eye. Eyes large, reddish. Antennae with distal two segments brown, finely pubescent and also with scattered brown hairs, the basal segments pale, with dark clothing hairs; proportion of segments, (male) 7:13:9:10. Rostrum testaceous, extending between hind coxae. Ponotum transverse, the collar distinct, the transverse impression deep, the front lobe raised and foveate as in **orbiculatus**, the explanate lateral margins distinctly narrower than in **orbiculata**, the lateral edges almost straight. Scutellum perhaps a little flatter than in **orbiculata**, constricted as in that species. Hemelytron with six spots and the costal margin pale, the latter slightly shiny and gradually widened from the base, the spots situated as those in **orbiculata** but smaller, narrower and not so bluish. Membrane maculate with smoky brown. Legs with clothing hairs less numerous, shorter, and more reclined than in **orbiculata**, the length of those on tibae being not noticeably greater than diameter of tibiae. Venter thickly, finely pubescent, black, the produced part of apical segment in female broadly pale.

Length: 3.1-36 mm. **Width**: pronotum, 1.2-1.3 mm.; hemelytra, 1.5-1.9 mm.

Holotype, male, Waubay, S. Dakota, June 22, 1939, H. C. Severin; **allotype**, female, Lost Island Lake, Palo Alto County, Iowa, September 16, 1932, H. M. Harris (in author's collection).

Named for Professor Harry C. Severin, whose assiduous collecting has contributed so much to the knowledge of South Dakota insects.

Family NOTONECTIDAE

Buenoa limnocastoris Hungerford. * Oak Lake, Sept. 17, 1941, H. C. S.; Elk Point, Sept. 5, 1940, G. B. S.

Buenoa macrotibialis Hungerford. * Oak Lake, Sept. 17, 1941, G. B. S.

Buenoa margaritacea Torre-Bueno. Canton, Aug. 26, 1923. H. C. S.

Family NEPIDAE

Ranatra fusca P. B. (= **americana** Mont.) Capa, June 1, 1921, H. C. S.; Belvidere, Sept. 22, 1939, G. B. S.

RACIAL VARIATION IN STRYMON COLUMELLA (FABRICIUS). (LEPIDOPTERA, LYCAENIDAE)

WILLIAM D. FIELD; Kansas.*

Comparisons made recently by the writer between Florida specimens of **Strymon columella** (Fabricius) and a series of specimens from Cuernavaca in the state of Morelos, Mexico, and from near Ciudad Victoria in the state of Tamaulipas, Mexico, taken by L. J. Lipovsky and H. D. Thomas in July and August of the year 1938, has led to the conclusion that two distinct subspecies are represented. According to Bates,[1] specimens from Cuba, Hispaniola, Jamaica, the Bahamas and Florida represent the same subspecies. This is of course the typical subspecies, described by Fabricius from the West Indies.[2] In the United States, typical **columella** extends from Florida through the Gulf States and has even been taken as far north as Aurora, New York, from which locality Grote[3] described a specimen of **columella** as a new species under the name of **Callicista ocellifera.**

The name **Thecla istapa** Reakirt[4] based upon specimens taken near Vera Cruz, Mexico, is available for the Mexican subspecies. **Strymon collumelle istapa** differs from **Strymon columella columella** in having all the maculation of the under surfaces greatly reduced. This is especially noticeable in the subanal eye spot found on this surface of the hind wing. In **istapa** the light colored lunule on the inner side of the marginal black spot is yellow, not orange as is the case in typical **columella**, and is rather thin being less than half as thick as the black spot. In **columella** the orange lunule is large, being as thick or nearly as thick as the black spot.

*Contribution from the Department of Entomology, University of Kansas.

[1] "Butterflies of Cuba". Bull. Mus. Comp. Zool. Harvard, vol. LXVIII, No. 2, p. 195, Feb. 1935.

[2] Ent. Syst., 3, p. 282, 1793.

[3] Bull. Buff. Soc. Nat Sci.: 1; p. 78, 1873

[4] Pr. Acad. Nat. Sci. 339, 1866.

A NEW U. S. RECORD (LEPIDOPTERA)

While collecting in the Big Bend country of Texas, near the town of Alpine, Dr. and Mrs. R. C. Turner, Jr., caught several specimens of a moth on April 28, 1942, which has been identified as **Hypopta (Comadia) redtenbacheri** Hamp. by T. N. Freeman of the Canadian National Museum. We have no record of this species having been recorded from the United States prior to this catch.—Don B. Stallings and Dr. J. R. Turner, Caldwell, Kansas.

—•—

AEDES AEGYPTI, LINNAEUS, THE YELLOW FEVER MOSQUITO, IN OKLAHOMA

During the later part of September, five adult specimens of **Aedes aegypti** were identified from mosquitoes submitted to the Oklahoma State Health Department from Muskogee County, Oklahoma. These mosquitoes, four females and one male, were collected by Mr. Robert Coker, a collector for the Malaria Control program operated by the Oklahoma State Health Department and the U. S. Public Health Service. This new distribution record is the westernmost occurrence of the species at this northerly latitude. Although the areas near the collection locations offered ideal breeding places for **A. aegypti**, investigations revealed no larvae.—Burton B. Hodgen, Malaria Control Entomologist, Oklahoma State Health Department.

—•—

THE TROPICAL RAT MITE IN KANSAS

On March 12, 1943, we received specimens of **Liponyssus bacoti** (Hirst) from Mr. E. E. King of Herington, Kansas. He reported that this mite had invaded part of a dwelling and that its bite is worse than that of any mosquito or ant ever was. Since this is our first encounter with this mite in Kansas and since it is a possible vector of endemic typhus fever, we feel that this note is worth recording. Doctor H. E. Ewing kindly confirmed my identification.—H. B. Hungerford.

NEW MOSQUITO RECORDS FOR COLORADO

During the summer of 1941, 407 adult mosquitoes were reared and pinned from larval collections obtained in the vicinity of Fort Logan, Colorado. The larvae were collected from ponds, lakes, irrigation ditches, and seep holes.

I wish to express my appreciation and thanks to Dr. Cornelius B. Philip of the Rocky Mountain Laboratory of Hamilton, Montana, for the determinations. The new distribution records for Fort Logan are: **Aedes dorsalis** Meig., **A. trivittatus** Coq:., **A. vexans** Meig., **Culex tarsalis** Coq., and **Theobaldia inornata** Will.

Similarly, larval collections from Colorado Springs, Colorado, were made during the summer of 1942, and 131 adults were reared and pinned from these collections. The adults were determined by Dr. Maurice T. James, formerly of Colorado State College, to whom I am greatly indebted. The seven new mosquito distribution records for the Colorado Springs region are: **Aedes dorsalis** Meig., **A. triseriatus** Say, **Culex tarsalis** Coq., **C. territans** Walk., **Theobald'a incidens** Thom., **T. inornata** Will., and **T. impatiens** Walk.—Roland W. Portman, University of Missouri.

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Correction: **Dikraneura hyaline** on page 58 should be **Dikraneura hyalina.**

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